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South Dakota Corn Performance Trials

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by

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Yield trials were conducted in four of the crop adaptation areas (Fig. 1) of South Dakota during 1961. The purpose of the tests is to supply farmers, ranchers and others in agri-business, information on the relative performance ability of the various hybrids entered under similar conditions of environment. The crop adaptation areas are based upon soil type, elevation, temperature, rainfall and other related conditions which comprise the environments for the respective test locations.

In 1961, four tests were planted, all in eastern South Dakota. Entries in each test varied from 13 to 22 hybrids planted in replicated plots. Data obtained were yield, moisture per cent of ear corn at harvest and, at some locations, lodging. Tables following the text present the data obtained.

Location of the 1961 Trials

Tests were conducted in four of the thirteen crop adaptation areas of the state. Figure 1 depicts the state of South Dakota as divided into crop adaptation areas. Entries were tested in areas C_1, D_2, D_3, and E during 1961. The exact location of these trials, soil types, and dates of planting and harvesting are shown in Table 1.

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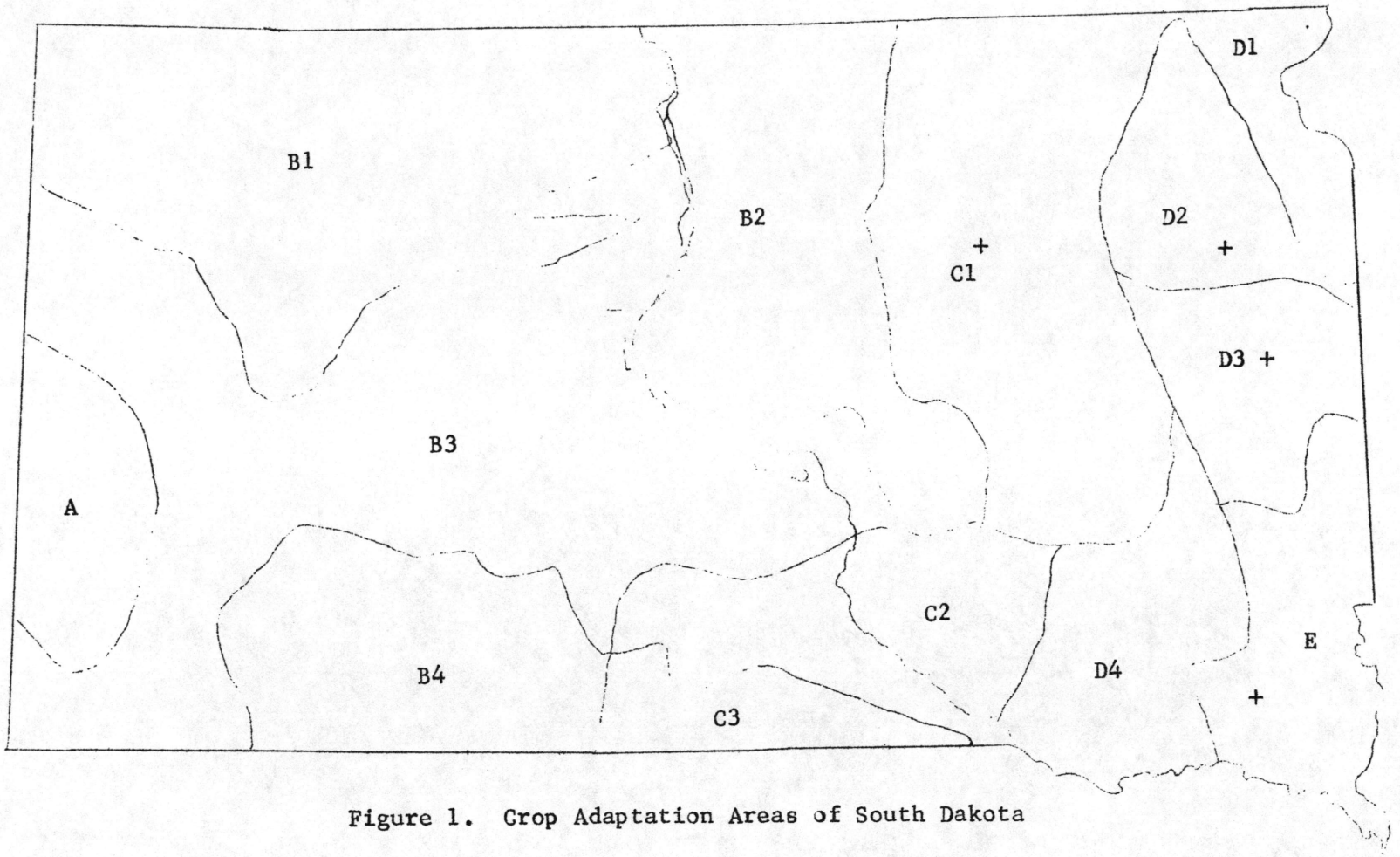

Figure 1. Crop Adaptation Areas of South Dakota

When evaluating and selecting hybrids for use in this state one should refer to the trials conducted nearest the area in which the hybrid is to be planted.

Table 1. Location of the 1961 Corn Performance Tests

District	County	Location	Post Office	Planted	Harvested
C_1	Spink	Redfield Devel. Farm	Redfield	May 24	Oct. 13
D_2	Codington	Northeast Expt. Farm	Watertown	May 23	Oct. 5
D_3	Brookings	Agronomy Farm	Brookings	May 23	Oct. 19 & 20
E	Clay	Southeast Expt. Farm	Centerville	May 19	Oct. 25

C_1	Beotia-Harmony silty clay loam
D_2	Kranzberg silt loam
D_3	Vienna loam
E	Kranzberg silty clay loam

Climatic Conditions

Table 2 presents the temperature and rainfall monthly averages and totals, respectively. These are based upon reports of the Monthly Climatological Data, U. S. Department of Commerce, Weather Bureau, Huron, South Dakota. Anyone desiring additional information on climatic conditions under which the corn test for the area in question was grown should check the information listed for the station closest to the trial.

Generally, precipitation was adequate in eastern South Dakota during the first half of the growing season. The test located in the D_2 area was under some moisture stress during July. The C_1 test received but minimum amounts of precipitation during August.

The greatest departure from normal temperatures occurred at Brookings, Areas D_3. Killing frosts of September 25 occurred near normal fall-frost dates in most areas. Temperatures warmed in early October and in combination with normal to above normal precipitation caused poor drying conditions until late October. Some entires failed to produce mature, good quality corn even with fall-frost dates occurring on or near the normally expected dates.

Table 2. Temperature and Precipitation for the 1961 Corn Growing Season of South Dakota

Station and District	Temperature in degrees F. Month	Ave.	Departure from normal	Ave. departure	Precipitation in inches Month	Ave.	Departure from normal	Total departure
Redfield	May	53.9			4.88			
6E	June	67.9			2.18			
	July	68.9			3.95			
C_1	Aug.	72.3			.70			
	Sept.	56.8			.60			
					12.31			
Watertown	May	49.4	-6.7		4.55		1.45	
NE farm	June	65.1	- .7		3.30		- .51	
	July	68.7	-3.9		1.13		-1.71	
	Aug.	67.2	-2.9		4.41		1.76	
	Sept.	55.6	-4.9	-3.8	3.75		1.62	2.61
					17.14			
Brookings	May	53.4	-4.2		6.00		3.35	
1E	June	66.3	-1.1		4.64		.65	
	July	68.8	-4.9		2.03		- .03	
D_3	Aug.	70.7	-0.6		5.52		2.62	
	Sept.	57.0	-4.6	-3.8	2.02		- .08	6.51
					20.31			
Center-ville	May	57.3			2.76			
SE farm	June	70.1			5.31			
	July	75.1			1.69			
	Aug.	74.6			3.88			
	Sept.	60.5			2.69			
					16.33			

Hybrid Entry Procedure

Hybrids registered by permanent name and number with the South Dakota State Department of Agriculture for the previous two years were eligible for entry in 1961.

Either closed or open-pedigree hybrids were eligible to be entered only once in each area. A nominal fee was charged for each entry in each area except entries included by Statewide Services as checks. These checks are hybrids developed by the South Dakota Agricultural Experiment Station.

A list of the entries included and the areas in which they were tested is recorded in Table 7.

Planting and Harvesting Procedures

Planting The entries included in each test were planted in four replications. Plots of individual hybrid entries were located at random within each replication. The individual plots contained two rows of 10 hills each with three kernels planted per hill. The planting dates are shown in Table 1.

Harvesting The test plots were picked separately and weighed. After weighing, each plot was sampled for moisture by taking 10 ears at random, removing a one-inch cross section by a machine developed for this purpose, and placing the cross-sections in a paper bag. Upon bagging the weights were recorded immediately in the field. The samples were oven-dried at 102° C. in the laboratory for at least 48 hours, reweighed, and moisture percentages determined. Dates of harvest are shown in Table 1.

Measurements of Performance

Yield The yield reported for each hybrid or variety in each test is the average obtained for field weights of all replications, expressed as bushels per acre of No. 2 shelled corn at 15.5 per cent moisture. Because of variations caused by unequal soil fertility, slope, and stands, varieties of equal potential may yield differently. Mathematical determinations have been made to ascertain whether yield differences are caused by variations in environment or were true varietal differences.

At the bottom of Tables 3 through 6 is given the maximum amount in each test by which two entries must differ in yield for the difference to be considered statistically significant at the 5 per cent level. If the trials were found to have statistically significant differences an additional test, Duncan's Multiple Range Test, was run on the means.

As an example of Duncan's Test, in Table 4 vertical lines on the right side of the table indicate those variety yields adjacent to the line which are statistically alike. In the instance of Table 4, under conditions that prevailed during 1961, S. D. Expt. 26, Pioneer 384, Agsco 100, Pioneer 391, S. D. 210, S. D. 220, S. D. 250 and Agsco 95 were not statistically different in yield from each other. It must be remembered that results from only one year do not present as true a picture of yield differences as average results of three or more years at the same location.

The average yield of all entries is found at the bottom of the yield columns in each table.

Moisture content The table for each trial presents the moisture content at harvest. This is the amount of moisture in the ear corn expressed in percentages. The average moisture content of all entries appears at the bottom of the moisture percentage column. Moisture content is directly related to corn maturity, and because maturity is of primary consideration in South Dakota, these figures are very important when an evaluation of the various entries is made.

Performance rating The two primary results, yield of grain and moisture percentage, are used in determining this rating. Because we realize how important the relationship between these two factors are for sound dry corn, this rating further aids in determining not only the yielding capabilities of the entries but also how moisture affects the overall determination as to what will produce sound corn with undue additional preparation or delays for storage.

Yields for each entry in each test were converted to percentages by comparing them with the average yield of all entries. Similar calculations were made for moisture at harvest time after first subtracting each moisture content from 100 so that the varieties would be ranked according to their ability to produce sound, rather than soft, corn.

With the yield and moisture percentages found for each variety, the performance rankings that appear in the tables were found as follows:

$$\frac{\text{(yield percentage) 6 plus (moisture percentage) 4}}{10}$$

Stand When reductions below 100 per cent occur in the number of hills, several things may be indicated; the seed of the entry was unable to produce a good stand under the environmental conditions prevailing for that test or something destroyed either the kernels before germination or the young plants. Thin stands reduce yields, and because this work is designed primarily to test yielding potential of the entries, corrections in yield were made for missing hills according to the formula:

$$CW = FW \frac{(H - 0.3M)}{(H-M)}$$

where CW - corrected weight, FW - field weight, H - number of hills planted per plot, and M - number of hills missing. No corrections were attempted for minor stand variations, that is, fewer than three stalks per hill.

Lodging Some tests present information on lodging. Any stalk broken over below the ear and/or leaning 30 degrees or more from perpendicular at ground level was recorded as lodged.

Average yields over a period of years Performance trials were failures due to drought conditions in the state during 1959. Tests were not conducted in 1960. This is the first year the program has been operated by Statewide Services on a fee basis so comparisions of past performance are not made in this publication.

Table 3. 1961 Corn Performance Test, Area C_1, Redfield

Variety	Acre Yield Bu/A.	Performance Rating	Moisture at Harvest %
Pioneer 368	54.8	3	27.0
Agsco 95	54.5	1	23.2
Pioneer 391	54.2	2	25.1
Disco 101A	52.9	4	23.9
S. D. 420	52.8	8	28.9
Pioneer 377A	51.4	6	25.2
Pioneer 388	51.3	5	24.3
S. D. 250	50.4	9	25.4
S. D. 220	50.1	7	22.8
Pioneer 383	49.4	10	24.4
Agsco 100	49.4	11	26.1
Pioneer 384	45.9	12	24.3
S. D. 270	44.3	13	26.3
Average	50.9		25.2

Yield differences of less than 11.1 bushels per acre are not significant.

Table 4. 1961 Corn Performance Test, Area D_2, Watertown

Variety	Acre Yield Bu/A.	Performance Rating	Moisture at Harvest %	Lodging %	Statistical significance using Duncan's Multiple Range Test at 5% level
S.D. Expt. 26	69.0	1	42.0	1	
Pioneer 384	65.9	4	41.5	0	
Agsco 100	64.3	6	41.9	1	
Pioneer 391	63.8	2	36.0	0	
S.D. 210	63.4	3	36.8	1	
S.D. 220	62.5	5	37.5	0	
S.D. 250	61.4	8	42.3	2	
Agsco 95	61.1	7	40.8	0	
Pioneer 388	58.6	10	39.5	0	
S.D. 240	58.1	11	41.3	1	
Agsco 90	58.0	9	37.6	2	
Pioneer 383	56.6	12	44.5	4	
Pioneer 368	54.2	13	47.4	2	
Pioneer 377A	54.0	14	45.6	1	
Average	60.7		41.1		

Yield differences of less than 7.6 bushels per acre are not significant.

Table 5. 1961 Corn Performance Test, Area D_3, Brookings

Variety	Acre Yield Bu/A.	Performance Rating	Moisture at Harvest %	Lodging %	Statistical significance using Duncan's Multiple Range Test at 5% level
Pioneer 376	99.6	1	32.3	7	
Pioneer 362	97.7	4	35.2	21	
Pioneer 374	97.3	3	30.4	12	
Disco 101A	96.6	2	29.2	9	
Pioneer 368	92.7	8	32.9	12	
Gurney's 104	92.6	7	31.7	12	
Pioneer 377A	91.1	5	28.7	13	
Gurney's 105A	90.7	10	32.0	6	
S.D. 270	90.2	6	27.6	14	
S.D. 250	88.2	9	28.4	21	
S.D. Expt. 26	84.3	11	28.9	29	
Pioneer 390	82.7	12	27.5	25	
Curry C-42	81.8	14	35.8	16	
GreenAcres 443	81.6	17	40.0	10	
GreenAcres 002	81.5	16	38.7	7	
Gurney's 100A	78.0	13	30.6	18	
S.D. 240	74.8	15	27.8	18	
Average	88.3		31.6		

Yield differences of less than 6.8 bushels per acre are not significant.

Table 6. 1961 Corn Performance Test, Area E, Centerville

Variety	Acre Yield Bu/A.	Performance Rating	Moisture at Harvest %	Lodging %	Statistical significance using Duncan's Multiple Range Test at 5% level
Pioneer 345	90.0	2	22.1	3	
S.D. Expt. 27	89.8	1	21.6	4	
Pioneer 329	88.0	6	25.9	2	
S.D. 622	87.3	9	25.4	3	
Pioneer 362	87.2	3	22.1	3	
Tristate 89	86.5	4	23.5	1	
Pioneer 328	86.4	12	27.0	1	
S.D. 604	86.2	5	23.3	5	
Gurney's 118A	85.6	7	22.7	2	
Disco 112A	84.7	8	21.8	3	
Pioneer 354	84.5	11	24.2	1	
GreenAcres 004	83.6	13	27.2	1	
Iowealth AF11	83.5	10	21.1	1	
GreenAcres 446	82.6	16.	29.2	0	
Curry C-68	81.1	15	27.1	1	
GreenAcres 395	79.3	17	25.7	2	
Gurney's 107	78.8	14	23.3	1	
Curry C-62	78.3	18	26.1	1	
Gurney's 118B	77.8	19	26.2	1	
Iowealth AQ	75.9	21	32.1	1	
GreenAcres 002	73.3	20	26.5	1	
GreenAcres 674	65.3	22	29.6	0	
Average	82.5		25.2		

Yield differences of less than 7.9 bushels per acre are not significant.

Table 7. The Entries Tested in the 1961 Corn Performance Trials and the Tables in Which They Appear.

Variety	Table	Variety	Table
Agsco 90	4	Pioneer 328	6
Agsco 95	3, 4	Pioneer 329	6
Agsco 100	3, 4	Pioneer 345	6
		Pioneer 354	6
Curry's C-42	5	Pioneer 362	5, 6
Curry's C-62	6	Pioneer 368	3, 4, 5
Curry's C-68	6	Pioneer 374	5
		Pioneer 376	5
Disco 101A	3, 5	Pioneer 377A	3, 4, 5
Disco 112A	6	Pioneer 383	3, 4
		Pioneer 384	3, 4
GreenAcres 002	5, 6	Pioneer 388	3, 4
GreenAcres 004	6	Pioneer 390	5
GreenAcres 395	6	Pioneer 391	3, 4
GreenAcres 443	5		
GreenAcres 446	6	Tristate 89	6
GreenAcres 674	6		
		S.D. 210	4
Gurney's 100A	5	S.D. 220	3, 4
Gurney's 104	5	S.D. 240	4, 5
Gurney's 105A	5	S.D. 250	3, 4, 5
Gurney's 107	6	S.D. 270	3, 5
Gurney's 118A	6	S.D. 420	3
Gurney's 118B	6	S.D. 604	6
		S.D. 622	6
Iowealth AF11	6		
Iowealth AQ	6	S.D. Expt. 26	4, 5
		S.D. Expt. 27	6